The Effect of Tri-sprintec and Metformin and Their Doses on the Mortality and Reproduction of Ampullariidae, Daphnia magna, and Lemnoideae & the Heart Rate of Daphnia magna in Aquatic Ecosystems

Das, Sarayu

In recent years, an increasing level of pharmaceuticals has been detected in rivers and streams. The purpose of this experiment was to test the effect of two of the most common drugs found at the Congaree National Park in South Carolina, metformin and tri-sprintec, on three prevalent aquatic species, snails (Ampullariidae), plants (Lemnoideae), and fleas (Daphnia magna). This experiment was done in two stages: phase one to study the effect of pharmaceuticals on the organisms and phase two to find the maximum threshold of pharmaceuticals affecting the lifespan of these species. It was hypothesized that when the dosage of pharmaceuticals increased, the Daphnia magna would experience increased heart rate, and the mortality and reproduction of these organisms would be negatively affected. This was achieved by placing the organisms in separate habitats, and three different doses of tri-sprintec and metformin were gradually added to their environments over three weeks. An ANOVA test of $F(2,8)=15.88$, $p=0.002$ for the heart rate of Daphnia magna and a linear regression t-test of $R(3)=0.97$, $p<0.01$ for the natural increase rate (NIR) of Daphnia magna showed that the pharmaceuticals did have a significant impact on these organisms. Furthermore, a linear regression t-test ($R(3)=0.88$, $p<0.04$) was run for Lemnoideae with metformin exposed for 3 and 5 ppt, and LD50 curves were generated. The results indicated that 3 ppt is the lethal dosage that eliminated at least 50% of the entire population for each drug. The researcher created a brochure about the best practices of disposing unused pharmaceuticals and circulated around to bring awareness. This community outreach was a success and the researcher continues to conduct classes, thus reducing this environmental problem at the source.

Awards Won:
Fourth Award of $500
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: First Award of $1,000